CLAIMS

1. A method for assaying an interaction between a test agent and a lipid bilayer-associated component, comprising:

providing a surface detector array device, said device comprising

a substrate having a surface defining a plurality of distinct bilayer-compatible surface regions separated by one or more bilayer barrier regions, said bilayer-compatible surface regions and said bilayer barrier regions being formed of different materials,

a plurality of lipid bilayer expanses localized above said plurality of distinct bilayer-compatible surface regions,

wherein said lipid bilayer expanses are localized above said surface regions in the absence of covalent linkages between said lipid bilayer expanses and said bilayer-compatible surface regions, and are separated therefrom by an aqueous film interposed between said bilayer-compatible surface regions and said corresponding lipid bilayer expanses;

contacting said device with a bulk aqueous phase comprising a test agent; and

evaluating a physical property of one or more of said lipid bilayer expanses.

2. The method of claim 1, wherein at least one of said plurality of lipid bilayer expanses further comprises a protein, a nucleic acid, a glycolipid, a lipopolysaccharide, a sterol, a lipid-linked molecule, or a fatty acid.

3. The method of claim 1, wherein at least one of said plurality of lipid bilayer expanses comprises a bacterial endotoxin.

4. The method of claim 1, wherein at least one of said plurality of lipid bilayer expanses comprises a label.

5. The method of claim 4, wherein said label is attached to a target membrane component.

6. The method of claim 4, wherein said label is attached to a background membrane component.

7. The method of claim 4, wherein said label is selected from the group consisting of a fluorophore, an electron spin resonance label, a radioactive label, a semiconductor nanoparticle label, and a metallic nanoparticle label.

8. The method of claim 1, wherein said physical property is selected from the group consisting of membrane fluidity, acyl chain mobility, membrane integrity, membrane appearance, membrane continuity, membrane thickness, membrane bending modulus, and membrane tension.

9. The method of claim 8, wherein said physical property is membrane fluidity.

10. The method of claim 9, wherein said membrane fluidity is evaluated using a method selected from the group consisting of fluorescence recovery after photobleaching, fluorescence anisotropy, fluorescence correlation spectroscopy, fluorescence resonance energy transfer, fluorescence resonance energy transfer microscopy, electrophoresis, and electrical molecular force microscopy.

11. The method of claim 8, wherein said physical property is acyl chain mobility.

12. The method of claim 11, wherein said acyl chain mobility is measured using an electron-spin labeled lipid.

13. The method of claim 11, wherein said acyl chain mobility is measured using a technique selected from the group consisting of Fourier-transformed infrared spectroscopy, sum frequency generation spectroscopy, and surface reflective spectroscopy.

14. The method of claim 8, wherein said physical property is membrane integrity.

15. The method of claim 14, wherein said membrane integrity is evaluated by monitoring a parameter selected from the group consisting of membrane resistance, membrane impedance, membrane conductance, membrane current, membrane capacitance, and membrane potential.

16. The method of claim 14, wherein said membrane integrity is evaluated using a method selected from the group consisting of fluorescence recovery after photobleaching, fluorescence anisotropy, fluorescence correlation spectroscopy, fluorescence resonance energy transfer, fluorescence resonance energy transfer microscopy, Fourier-transformed infrared spectroscopy, fluorescence microscopy, electrophoresis, electrical molecular force microscopy, reflection interference contrast microscopy, atomic force microscopy, lateral/frictional force microscopy, chemical force microscopy, and quantitative image analysis of membrane appearance.

17. The method of claim 8, wherein said physical property is membrane appearance.

18. The method of claim 17, wherein said membrane appearance is evaluated using a method selected from the group consisting of reflection interference contrast microscopy, atomic force microscopy, lateral/frictional force microscopy, chemical force microscopy, and electrical molecular force microscopy.

19. The method of claim 8, wherein said physical property is membrane continuity.

20. The method of claim 19, wherein said membrane continuity is evaluated by monitoring a parameter selected from the group consisting of membrane resistance, membrane impedance, membrane conductance, membrane current, membrane potential, and membrane fluidity.

21. The method of claim 19, wherein said membrane continuity is evaluated using a method selected from the group consisting of fluorescence recovery after photobleaching, fluorescence anisotropy, fluorescence correlation spectroscopy, fluorescence resonance energy transfer, fluorescence resonance energy transfer microscopy, electrophoresis, and electrical molecular force microscopy.

22. The method of claim 8, wherein said physical property is membrane thickness.

23. The method of claim 22, wherein said membrane thickness is evaluated by atomic force microscopy.

24. The method of claim 8, wherein said physical property is membrane bending modulus.

25. The method of claim 8, wherein said physical property is membrane tension.

26. A method for assaying an interaction between a test agent and a lipid bilayer-associated component, comprising:

providing a lipid bilayer expanse;

contacting said lipid bilayer expanse with a bulk aqueous phase comprising a test agent; and

evaluating the membrane fluidity of said lipid bilayer expanse.

27. The method of claim 26, wherein said lipid bilayer expanse further comprises a protein, a nucleic acid, a glycolipid, a lipopolysaccharide, a sterol, a lipid-linked molecule or a fatty acid.

28. The method of claim 26, wherein said lipid bilayer expanse comprises a bacterial endotoxin.

29. The method of claim 26, wherein said lipid bilayer expanse comprises a label.

30. The method of claim 29, wherein said label is attached to a target membrane component.

31. The method of claim 29, wherein said label is attached to a background membrane component.

32. The method of claim 29, wherein said label is selected from the group consisting of a fluorophore, an electron spin resonance label, a radioactive label, a semiconductor nanoparticle label, and a metallic nanoparticle label.

33. The method of claim 26, wherein said membrane fluidity is evaluated using a method selected from the group consisting of fluorescence recovery after photobleaching, fluorescence anisotropy, fluorescence correlation spectroscopy, fluorescence resonance energy transfer, fluorescence resonance energy transfer microscopy, electrophoresis, and electrical molecular force microscopy.

34. The method of claim 1, wherein the test agent is a small molecule.

35. The method of claim 1, wherein the test agent is a protein.

36. The method of claim 1, wherein the test agent comprises a surface of a cell, a vesicle, a phantom cell, a cell-vesicle, a liposome, a giant vesicle, a lipid-covered glass bead, or a component of any thereof.

37. The method of claim 26, wherein the test agent is a small molecule.

38. The method of claim 26, wherein the test agent is a protein.

39. The method of claim 26, wherein the test agent comprises a surface of a cell, a vesicle, a phantom cell, a cell-vesicle, a liposome, a giant vesicle, a lipid-covered glass bead, or a component of any thereof.

40. The method of claim 1, wherein the bulk aqueous phase further comprises a second test agent in and further comprising determining whether said second test agent affects the interaction of the test agent with the lipid bilayer-associated component.

41. The method of claim 26, wherein the bulk aqueous phase further comprises a second test agent, and further comprising determining whether

said second test agent affects the interaction of the test agent with the lipid bilayer-associated component.